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Disorders of later infancy and childhood

Respiratory disorders

The common cold, or acute nasopharyngitis, the most common respiratory disease in children, is caused by a large number of viruses and may be complicated by superimposed bacterial infection. There is no specific treatment.

Tonsillitis (acute infection of the **tonsils**) is more properly considered a part of the acute-pharyngitis (throat-inflammation) syndrome. Enlargement of the tonsils as a result of recurrent infection often leads to the decision to remove the tonsils, a course many physicians now believe is rarely indicated. Enlarged tonsils do not cause irritability, poor appetite, or poor growth.

Enlargement of the adenoids (lymphoid tissue in the nasal part of the pharynx) as a result of recurrent infection can result in mouth breathing and a so-called adenoidal facial appearance, the most conspicuous feature of which is the constantly open mouth. By blocking the eustachian tube, it can contribute to infections of the middle ear (otitis media) and to hearing loss. In children with chronic middle-ear disease and a specific type of hearing loss, removal of adenoids may be indicated.

Croup is an inflammatory disease of the larynx (voice box) or **epiglottitis** (the plate of cartilage that shuts off the entrance into the larynx during the process of swallowing), most often caused by viral infection; it is encountered in infants and small children. Inflammation

and swelling of the vocal cords lead to respiratory obstruction, particularly in the inspiratory phase, and a croupy cough, which sounds like the bark of a seal.

Allergic rhinitis (inflammation of the nasal passages) is the most common allergic disorder of childhood. Seasonal allergic rhinitis, or hay fever, due to sensitization to house dust, pollen, or molds, is characterized by attacks of sneezing, nasal itching, and a watery nasal discharge during the season when the specific allergens are prevalent. Similar symptoms are present in perennial allergic rhinitis but without seasonal pattern. In addition to inhalants, sensitization to specific foods may underlie the disorder. Treatment consists of avoidance of the substances causing the reaction, desensitization, and use of decongestant drugs and antihistamines (drugs that, by inactivating the histamine given off by injured cells, suppress many of the symptoms of an allergic attack).

Asthma is a common allergic disorder of children that affects the bronchi and bronchioles (the large and small air passages in the lungs). Spasm, edema, and abnormal secretion of mucus result in obstruction of the lower respiratory tract and characteristic wheezing and laboured breathing. Inhalant allergens, particularly dust, molds, and pollens, and foods may play important causal roles. Psychologic stress may be a precipitating factor, but viral or bacterial infection of the respiratory tract is a more common triggering factor. A variety of effective treatments is available, together with preventive measures that reduce the chances of recurrent attacks. The outlook generally is good, with only a small percentage of children continuing to have severe asthma into adult life.

In discussing childhood respiratory diseases, tuberculosis and cystic fibrosis should be included. Both of these disorders predominantly affect the lungs, although many other organs may also be involved. Tuberculosis continues to be a major world health problem. As countries improve public-health standards and increase their socioeconomic level, the illness and mortality from this disease decrease steadily. Tuberculosis appears mostly in a primary form consisting of a small localized lesion of the lung that either heals completely or remains quiescent for many years. Only infrequently among children does the disease extend to involve other parts of the lung or other parts of the body, such as bones, kidneys, or the central nervous system. Miliary tuberculosis, a generalized form of infection, and tuberculous meningitis are the most severe forms of the disease and have an extremely high mortality, although recovery

may occur with proper treatment. These forms most commonly occur in young children. As with other diseases, tuberculosis is better prevented than treated. A form of immunization (BCG—bacille Calmette-Guérin—vaccine) is utilized in areas of the world in which the disease is endemic. In other areas, control depends on prevention of contacts and early identification and treatment, if necessary, of infected individuals. A variety of antibiotic agents is effective in treatment, particularly the drugs isoniazid and rifampin.

Cystic fibrosis is a hereditary disorder of the exocrine glands (*i.e.*, those glands that release secretions through ducts). It affects many organ systems, but the lungs suffer most severely. Estimates of incidence vary from one in 3,700 to one in 1,000 live births. It is rare among blacks and Orientals and is transmitted as a recessive trait. The underlying metabolic defect is unknown, but the disease appears to start with the secretion of unusually thick and sticky mucus. In fetuses, intestinal obstruction may result from the production of viscid meconium. Pulmonary involvement may be apparent in the newborn or may develop during childhood, with repeated bouts of atelectasis (collapse of the lungs) and ultimate bronchiectasis (chronic dilation and degeneration of bronchi and bronchioles). Pancreatic insufficiency leads to a malabsorption syndrome, with fatty, bulky stools and malnutrition. The liver may be involved. Abnormality of the sweat glands is evidenced by a high salt content of the sweat, which, in hot weather, may lead to salt depletion and collapse. Treatment is directed toward the many organs involved, particularly with regard to aggressive therapy for respiratory tract infections. Regulation of diet and administration of pancreatic enzymes contribute to the maintenance of adequate nutrition. The ultimate outlook is grave, although therapy has been successful in markedly prolonging life. Many affected persons survive into adult life.

Sinusitis, otitis, bronchitis (inflammation of the sinuses, the ears, and the bronchi, respectively), and pneumonia occur commonly in children and do not differ in essential detail from the same diseases in adults. Other conditions that affect children and adults alike are described in **respiratory disease**.

Cardiovascular disorders

Congenital **heart** defects, treated earlier in this article, rank among the most common sources of cardiovascular difficulties in children. Among acquired heart diseases in children, **rheumatic fever** is the most important

cause worldwide, although it has become far less common and less severe in developed countries. Rheumatic fever strikes mainly between the ages of five and 15, occurring as an abnormal reaction to a beta-hemolytic streptococcal throat infection of a few weeks previous. Heart involvement may not be apparent early, but 60 percent of the victims develop rheumatic heart disease in later life; mitral stenosis (narrowing of the mitral valve) is a particularly common complication.

Most disorders of cardiac rate and rhythm in childhood are benign. An exception is paroxysmal atrial tachycardia, a disorder characterized by a steady, rapid heart rate, which in infants may exceed 300 beats per minute. If the disorder persists, it may lead to heart failure. Treatment with digitalis usually restores normal rhythm.

Pericarditis and myocarditis, inflammation of the sac enclosing the heart and of the heart muscle, are caused by a variety of infectious agents; they may result from systemic diseases. The most common cause is acute rheumatic fever. Symptoms include pain, fever, and evidence of heart failure. Treatment and prospects of recovery depend on the underlying cause.

Bacterial endocarditis (bacterial infection of the heart lining) occurs most frequently in children with preexisting heart disease. The most common organism is the alpha streptococcus, which accounts for 80 percent of cases. Common symptoms are fever, a sense of ill health, and fatigue. The outlook depends on the sensitivity of the infecting organism to antibiotic drugs, the age of the affected child, and the type of underlying heart disease.

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sudden infant death syndrome

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(*SIDS*), also called *crib death*, or *cot death*, unexpected death of an apparently healthy infant from unexplained causes. SIDS is of worldwide incidence, and within industrialized countries it is the most common cause of death of infants between two weeks and one year old. In 95 percent of SIDS cases, infants are two to four months old.

Sudden infant death syndrome occurs almost always during sleep at night. Its cause remains unknown. From the time of its identification, researchers have posited a number of causes—from a theory (popular in the 1960s and since discredited) that SIDS was caused by parental neglect to suggestions that SIDS was triggered by childhood vaccinations, blood disorders, and apnea (a disorder in which breathing is arrested during sleep)—but none has been borne out by further research. A higher incidence of SIDS is seen among premature and low-birth-weight infants, as well as among those born to teenagers, women who smoke heavily, and those who have received poor prenatal care. In the late 1980s researchers began to examine the brain development of infants, theorizing that some abnormality in the process of learning a response to respiratory distress would explain the syndrome.

Because studies have shown a higher incidence of SIDS among infants who sleep on their stomachs, physicians now recommend that infants be positioned to sleep on their back or side.

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Asthma

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respiratory disorder marked by sudden episodes of coughing, wheezing, shortness of breath, and feelings of suffocation. In the human **respiratory** system, air passes through the nasal passages or mouth to the trachea, or windpipe. The trachea then branches into two passages called the bronchial tubes. These tubes divide into a network of smaller tubes, called bronchioles, that supply the lungs with air from the atmosphere. Asthma causes the muscles surrounding the bronchioles to constrict so much that air has difficulty reaching the lungs. The mucous membranes in the affected parts of the lungs swell, contributing to the problem by making the passageways even narrower and producing thick mucus. The person suffering an asthma episode, or attack as it is often called, then experiences difficulty in breathing. The presence of mucus in the lungs causes a further feeling of suffocation. The attacks usually last for a short time, but prolonged attacks can be more serious and even life threatening. (See also **Respiratory System**.)

An asthma attack may start with a dry cough and a tight feeling in the chest. A person suffering an attack then often experiences shortness of breath, wheezing, a feeling of suffocation, and eventually a moist cough as the attack subsides. Also associated with the disorder are fatigue, loss of appetite, and irritability. If the asthma is caused by an allergic reaction, the nose, eyes, and ears may itch, and there may be sneezing and a runny nose. Attacks often occur at night and may last from thirty minutes to a few hours. Toward the end of the attack the cough changes from dry to moist, and large amounts of mucus or phlegm are brought up with the cough.

An attack may be followed in a few hours or days by another, or it may be months or years before another one occurs. If drugs are ineffective in controlling a prolonged attack, the person is said to be in status asthmaticus. Attacks that are unresponsive to medicine are the most dangerous and life-threatening forms of the disease. In this form of asthma, the bronchial tubes become congested with thick mucus and the airflow is severely reduced. The patient then becomes fatigued and drowsy as carbon dioxide builds up in the blood. Emergency treatment can usually restore adequate breathing.

Causes.

Asthma may be caused by infection, by allergic reaction, or by a disorder of the autonomic nervous system, which controls, among other things, relaxation and contraction of the muscles of the bronchioles. Asthma caused by infection is termed intrinsic asthma. Viruses (such as the common cold and influenza), bacteria, fungi, protozoa, and other microorganisms can provoke asthma in susceptible individuals. Many infections of the nose, throat, sinuses, and larynx that can lead to asthma occur most frequently in early childhood. Tonsillitis, sinusitis, laryngitis, and croup (a viral infection that causes inflammation and narrowing of the airways), are more common among the very young. And because their airways are already narrow, the young sometimes develop asthma after contracting these diseases. Other viral diseases such as measles and chicken pox affect the **respiratory** tract and may also lead to the development of childhood asthma. It is believed that viral illness is the main cause of asthma in children under the age of 5 and in adults 40 or older.

Workers exposed to certain chemicals may also develop asthma. Chemicals that remain in the bloodstream can then trigger asthmatic attacks. In the electronics industry, for example, solders used to connect parts employ a resin that can cause strong allergic reactions. Many solvents and cleaning fluids used in maintenance work also contain chemicals that can produce asthma attacks.

Asthma caused by an allergic reaction is termed extrinsic asthma. Allergic reactions are brought on by substances called allergens. Pollen, house dust, air pollution, animal fur, and mites (often found in house dust) are examples of allergens that can trigger an asthma attack in susceptible people. Chemical substances in the blood of the asthma patient are believed to be responsible for the sensitivity to allergens. These substances trigger the spasms of the bronchial tubes that lead to an asthma attack. Extrinsic asthma is more common than intrinsic asthma among people between the ages of 5 and 40.

Air pollution is a chief cause of **respiratory** problems, including asthma attacks. Tobacco smoke of any kind is particularly dangerous for an asthmatic condition. People who have asthma should not smoke, and they also have to be concerned about the harmful effect of secondhand smoke from family members, coworkers, and others in public places.

Weather changes may also cause asthma attacks. Very cold weather, hot humid periods, cold, damp, and foggy conditions, and sudden changes in the weather may all be factors contributing to an attack. In the past, people suffering from asthma were advised to live in warm and dry climates such as the southwestern United States, but that region no longer enjoys the benefits of a pollen- and pollution-free zone. Population and economic growth there has brought with it all the allergens and pollutants to which extrinsic

asthma responds.

Mediators.

Histamines, leukotrienes, and other chemical substances produced by the body are responsible for the symptoms of asthma. These chemicals are called mediators and are released from certain types of cells such as mast cells, epithelial cells, and macrophages. The cells that release the mediators are part of the immune system.

The immune system protects the body from outside attack. In asthma-prone individuals the immune system overreacts. It produces the mediator cells when allergens or viruses enter the body. The histamines and leukotrienes are responsible for the swelling and inflammation that take place during an asthma attack. (See also Allergy; Immune System.)

Onset.

Asthma in children usually begins before the age of 5. More boys than girls have asthma until about the age of 13; thereafter that tendency reverses, and more girls than boys begin to show the condition. Overall, asthma seems to be evenly distributed between the genders. Symptoms lessen and asthma may even go into remission for many children as they reach adolescence or enter adulthood. If the condition is present throughout childhood and adolescence, it will most likely persist into adulthood. All human populations seem to be susceptible to the disease. There seems to be an inheritable predisposition to the disorder.

Prevention and treatment.

There is no cure for asthma, but it can be treated and managed so that the asthma sufferer can live a normal life. Prevention is best practiced by avoiding allergens, stress, or other irritants that trigger the attack. These should be identified and avoided whenever possible.

Drugs are also used to treat asthma. One type of drug relaxes the bronchial muscles. Another kind widens the walls of the bronchial tubes. A third type of drug acts to prevent the attack. Other drugs are used to control swelling and inflammation. Inhaling devices are commonly used to deliver the drugs quickly to the sites where they are needed, and there are fewer side effects than with some other delivery methods.

In the case of asthma brought on by allergic reactions, immunotherapy is sometimes used. Small amounts of the allergen are injected to reduce the sensitivity of the immune system to the allergen. Dosages are slowly increased until there is no response to the allergen.

Self-management enables some patients to care for the condition without the aid of a physician. For some people biofeedback is an effective self-management system can control some involuntary bodily functions such as breathing. Through biofeedback techniques some patients suffering from an asthma attack are able to regain some control of normal breathing.

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